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IS/IEC 60793-1-1 (2008): Optical Fibres, Part 1: Measurement Methods and Test Procedures, Section 1: General and Guidance [LITD 11: Fibre Optics, Fibers, Cables, and Devices]

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“Knowledge is such a treasure which cannot be stolen”

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IS/IEC 60793-1-1 : 2008
[Superseding IS 15056 (Part 1/Sec 1) : 2002]

भारतीय मानक

प्रकाशिक तंतु

भाग 1 मापन विधियाँ और परीक्षण प्रक्रियाएँ

अनुभाग 1 सामान्य एवं मार्गदर्शन

Indian Standard

OPTICAL FIBRES

PART 1 MEASUREMENT METHODS AND TEST PROCEDURES

Section 1 General and Guidance

ICS 33.180.10

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 2012 **Price Group 3**

Fibre Optics, Fibres, Cables and Devices Sectional Committee, LITD 11

NATIONAL FOREWORD

This Indian Standard (Part 1/Sec 1) which is identical with IEC 60793-1-1 : 2008 'Optical fibres — Part 1-1: Measurement methods and test procedures — General and guidance' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Fibre Optics, Fibres, Cables and Devices Sectional Committee and approval of the Electronics and Information Technology Division Council.

This standard was originally published as IS 15056 (Part 1/Sec 1) : 2002 'Optical fibres: Part 1 Generic specification, Section 1 General' which was identical with IEC 60793-1-1 : 1995. The committee has now been decided to adopt this standard in a single number as IS/IEC 60793-1-1 : 2008 in order to align it with the latest version of IEC 60793-1-1 : 2008. However this has been superseding IS 15056 (Part 1/Sec 1) for rationalization of nomenclature and after the publication of this standard IS 15056 (Part 1/Sec 1) : 2002 shall be treated as withdrawn.

The text of IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 60793-1-20 : 2001 Optical fibres — Part 1-20 : Measurement methods and test procedures — Fibre geometry	IS/IEC 60793-1-20 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 20 Fibre geometry	Identical
IEC 60793-1-21 : 2001 Optical fibres — Part 1-21: Measurement methods and test procedures — Coating geometry	IS/IEC 60793-1-21 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 21 Coating geometry	do
IEC 60793-1-22 : 2001 Optical fibres — Part 1-22 Measurement methods and test procedures — Length measurement	IS/IEC 60793-1-22 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 22 Length measurement	do
IEC 60793-1-30 : 2010 Optical fibres — Part 1-30: Measurement methods and test procedures — Fibre proof test	IS/IEC 60793-1-30 : 2010 Optical fibres: Part 1 Measurement methods and test procedures, Section 30 Fibre proof test	do
IEC 60793-1-31 : 2010 Optical fibres — Part 1-31: Measurement methods and test procedures — Tensile strength	IS/IEC 60793-1-31 : 2010 Optical fibres: Part 1 Measurement methods and test procedures, Section 31 Tensile strength	do

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 60793-1-32 : 2010 Optical fibres — Part 1-32: Measurement methods and test procedures — Coating strippability	IS/IEC 60793-1-32 : 2010 Optical fibres: Part 1 Measurement methods and test procedures, Section 32 Coating strippability	Identical
IEC 60793-1-33 : 2001 Optical fibres — Part 1-33: Measurement methods and test procedures — Stress corrosion susceptibility	IS/IEC 60793-1-33 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 33 Stress corrosion susceptibility	do
IEC 60793-1-34 : 2006 Optical fibres — Part 1-34: Measurement methods and test procedures — Fibre curl	IS/IEC 60793-1-34 : 2006 Optical fibres: Part 1 Measurement methods and test procedures, Section 34 Fibre curl	do
IEC 60793-1-40 : 2001 Optical fibres — Part 1-40: Measurement methods and test procedures — Attenuation	IS/IEC 60793-1-40 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 40 Attenuation	do
IEC 60793-1-41 : 2010 Optical fibres — Part 1-41: Measurement methods and test procedures — Bandwidth	IS/IEC 60793-1-41 : 2010 Optical fibres: Part 1 Measurement methods and test procedures, Section 41 Bandwidth	do
IEC 60793-1-42 : 2007 Optical fibres — Part 1-42: Measurement methods and test procedures — Chromatic dispersion	IS/IEC 60793-1-42 : 2007 Optical fibres: Part 1 Measurement methods and test procedures, Section 42 Chromatic dispersion	do
IEC 60793-1-43 : 2001 Optical fibres — Part 1-43: Measurement methods and test procedures — Numerical aperture	IS/IEC 60793-1-43 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 43 Numerical aperture	do
IEC 60793-1-44 : 2001 Optical fibres — Part 1-44: Measurement methods and test procedures — Cut-off wavelength	IS/IEC 60793-1-44 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 44 Cut-off wavelength	do
IEC 60793-1-45 : 2001 Optical fibres — Part 1-45: Measurement methods and test procedures — Mode field diameter	IS/IEC 60793-1-45 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 45 Mode field diameter	do
IEC 60793-1-46 : 2001 Optical fibres — Part 1-46: Measurement methods and test procedures — Monitoring of changes in optical transmittance	IS/IEC 60793-1-46 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 46 Monitoring of changes in optical transmittance	do
IEC 60793-1-47 : 2009 Optical fibres — Part 1-47: Measurement methods and test procedures — Macrobending loss	IS/IEC 60793-1-47 : 2009 Optical fibres: Part 1 Measurement methods and test procedures, Section 47 Macrobending loss	do
IEC 60793-1-48 : 2007 Optical fibres — Part 1-48: Measurement methods and test procedures — Polarization mode dispersion	IS/IEC 60793-1-48 : 2007 Optical fibres: Part 1 Measurement methods and test procedures, Section 48 Polarization mode dispersion	do
IEC 60793-1-49 : 2006 Optical fibres — Part 1-49: Measurement methods and test procedures — Differential mode delay	IS/IEC 60793-1-49 : 2006 Optical fibres: Part 1 Measurement methods and test procedures, Section 49 Differential mode delay	do

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 60793-1-50 : 2001 Optical fibres — Part 1-50: Measurement methods and test procedures — Damp heat (steady state)	IS/IEC 60793-1-50 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 50 Damp heat (steady state)	Identical
IEC 60793-1-51 : 2001 Optical fibres — Part 1-51: Measurement methods and test procedures — Dry heat	IS/IEC 60793 -1-51 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 51 Dry heat	do
IEC 60973-1-52 : 2001 Optical fibres — Part 1-52: Measurement methods and test procedures — Change of temperature	IS/IEC 60793 -1-52 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 52 Change of temperature	do
IEC 60973-1-53 : 2001 Optical fibres — Part 1-53: Measurement methods and test procedures — Water immersion	IS/IEC 60793 -1-53 : 2001 Optical fibres: Part 1 Measurement methods and test procedures, Section 53 Water immersion	do
IEC 60793-1-54 : 2003 Optical fibres — Part 1-54 :Measurement methods and test procedures — Gamma irradiation	IS/IEC 60793-1-54 : 2003 Optical fibres: Part 1 Measurement methods and test procedures, Section 54 Gamma irradiation	do
IEC 60793-2 : 2007 Optical fibres — Part 2: Product specifications — General	IS/IEC 60793-2 : 2007 Optical fibres: Part 2 Product specifications — General	do
IEC 61931 : 1998 Fibre optic — Terminology	IS/IEC 61931 : 1998 Fibre optic — Terminology	do

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

OPTICAL FIBRES

PART 1 MEASUREMENT METHODS AND TEST PROCEDURES

Section 1 General and Guidance

1 Scope and object

This part of IEC 60793 lists and gives guidance on the use of documents giving the uniform requirements for measuring and testing optical fibres, thereby assisting in the inspection of fibres and cables for commercial (mostly telecommunications) purposes.

The individual measurement and test methods are contained in the different parts of the IEC 60793 series. They are identified as IEC 60793-1-X, where "X" is an assigned sub-part number, indicating its affiliation to IEC 60793-1.

In general, measurements and tests methods apply to all class A multimode fibres and Class B single-mode optical fibres covered by the IEC 60793-2 series, although there may be exceptions. Clause 1 of each part of IEC 60793 contains the scope for each particular attribute.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60793 (all parts), *Optical fibres*

IEC 60793-1-20, *Optical fibres – Part 1-20: Measurement methods nd test procedures – Fibre geometry*

IEC 60793-1-21, *Optical fibres – Part 1-21: Measurement methods and test procedures – Coating geometry*

IEC 60793-1-22, *Optical fibres – Part 1-22: Measurement methods and test procedures – Length measurement*

IEC 60793-1-30, *Optical fibres – Part 1-30: Measurement methods and test procedures – Fibre proof test*

IEC 60793-1-31, *Optical fibres – Part 1-31: Measurement methods and test procedures – Tensile strength*

IEC 60793-1-32, *Optical fibres – Part 1-32: Measurement methods and test procedures – Coating strippability*

IEC 60793-1-33, *Optical fibres – Part 1-33: Measurement methods and test procedures – Stress corrosion susceptibility*

IEC 60793-1-34, *Optical fibres – Part 1-34: Measurement methods and test procedures – Fibre curl*

IEC 60793-1-40, *Optical fibres – Part 1-40: Measurement methods and test procedures – Attenuation*

IEC 60793-1-41, *Optical fibres – Part 1-41: Measurement methods and test procedures – Bandwidth*

IEC 60793-1-42, *Optical fibres – Part 1-42: Measurement methods and test procedures – Chromatic dispersion*

IEC 60793-1-43, *Optical fibres – Part 1-43: Measurement methods and test procedures – Numerical aperture*

IEC 60793-1-44, *Optical fibres – Part 1-44: Measurement methods and test procedures – Cut-off wavelength*

IEC 60793-1-45, *Optical fibres – Part 1-45: Measurement methods and test procedures – Mode field diameter*

IEC 60793-1-46, *Optical fibres – Part 1-46: Measurement methods and test procedures – Monitoring of changes in optical transmitttance*

IEC 60793-1-47, *Optical fibres – Part 1-47: Measurement methods and test procedures – Macrobending loss*

IEC 60793-1-48, *Optical fibres – Part 1-48: Measurement methods and test procedures – Polarization mode dispersion*

IEC 60793-1-49, *Optical fibres – Part 1-49: Measurement methods and test procedures – Differential mode delay*

IEC 60793-1-50, *Optical fibres – Part 1-50: Measurement methods and test procedures – Damp heat (steady state)*

IEC 60793-1-51, *Optical fibres – Part 1-51: Measurement methods and test procedures – Dry heat*

IEC 60793-1-52, *Optical fibres – Part 1-52: Measurement methods and test procedures – Change of temperature*

IEC 60793-1-53, *Optical fibres – Part 1-53: Measurement methods and test procedures – Water immersion*

IEC 60793-1-54 *Optical fibres – Part 1-54: Measurement methods and test procedures – Gamma irradiation*

IEC 60793-2, *Optical fibres – Product specifications– General*

IEC 61931:1998, *Fibre optic – Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 61931 apply.

4 Measurement and test categories

The categories include:

a) parameter measurements;
b) performance measurements;
c) compliance tests.

According to several different areas, the tests are grouped, as follows:

Parts 1-10 to 1-19: General

Parts 1-20 to 1-29: Measurement methods and test procedures for dimensions

IEC 60793-1-20

IEC 60793-1-21
IEC 60793-1-22

Parts 1-30 to 1-39: Measurement methods and test procedures for mechanical characteristics

IEC 60793-1-30

IEC 60793-1-31

IEC 60793-1-32

IEC 60793-1-33

IEC 60793-1-34

Parts 1-40 to 1-49: Measurement methods and test procedures for transmission and optical characteristics

IEC 60793-1-40

IEC 60793-1-41

IEC 60793-1-42

IEC 60793-1-43

IEC 60793-1-44

IEC 60793-1-45*r*

IEC 60793-1-46

IEC 60793-1-47

IEC 60793-1-48

IEC 60793-1-49

Parts 1-50 to 1-59:	Measurement methods and test procedures for environmental characteristics.
	IEC 60793-1-50
	IEC 60793-1-51
	IEC 60793-1-52
	IEC 60793-1-53
	IEC 60793-1-54

5 Standard atmospheric measurement and test conditions

Standard atmospheric conditions need to be controlled within some range to ensure proper correlation of data obtained from measurements and tests conducted in various facilities. Conduct measurement and test conditions under the following atmospheric conditions, unless otherwise specified. In some cases, special ambient conditions may be needed and can be specified in the detail specification.

Table 1 gives the standard range of atmospheric conditions for carrying out measurements and tests:

Table 1 – Standard range of atmospheric conditions

Condition	Standard
Temperature	23 °C ± 5 °C
Relative humidity	45 % ± 25 %
Atmospheric pressure (limits are inclusive)	Site ambient

Keep variations in ambient temperature and humidity to a minimum during a series of measurements.

6 Calibration guidance

The process of calibration may be defined as the set of operations which establish, under specified conditions, the relationship between values indicated by a measuring system and the known values of a reference material. Once established, this relationship may be used to adjust the measuring system to correct for measurement bias. Adjustment of the system may, for example, take the form of hardware or a software adjustment.

Follow the instructions given in the test procedure documents as may be necessary for calibration and adjustment of the apparatus to ensure successful application of the documents. If suitable reference materials do not exist, then consideration should be given to an appropriate strategy to minimise measurement uncertainty.

Record relevant information of the calibration process, such as the calibrated value and uncertainty of the reference material or test equipment used.

7 Reference test methods

Several attributes have an agreed-upon reference test method (RTM). This is the method that shall be used to settle disputes.

8 Categories of optical fibres

The measurement methods and test procedures indicated in this standard apply to fibre categories described in Clause 5 of IEC 60793-2, as appropriate.

9 Packaging

For handling and shipping of optical fibres, the packaging device shall meet the following requirements:

a) winding techniques shall enable the optical fibre to withstand transport and specified environmental conditions;

b) the possibility of measuring the dimensions, transmission and optical characteristics of the optical fibre without removal of the fibre from the packaging device shall be indicated;

c) reel dimensions shall be provided to the customer.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: LITD 11 (3157).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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